

AMENDMENT UNDER 37 C.F.R. § 1.111
U.S. Application No.: 10/613,044

Attorney Docket Q79465

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application:

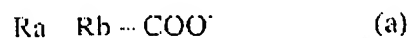
LISTING OF CLAIMS:

1. (currently amended): A resist composition comprising:
 - (A) a compound capable of generating an active seed upon irradiation with one of an actinic ray and a radiation,
 - (B) a compound capable of reacting with the active seed generated from the compound (A) and/or performing electron transfer to generate an active seed different from the active seed generated from the compound (A),
 - (C) a compound capable of performing electron transfer from the active seed generated from the compound (B) to generate an acid,and the following component (D1) or (D2):
 - (D1) an alkali-soluble resin having a phenol skeleton and having a molecular weight of 3,000 or more,
 - (D2) a resin capable of increasing its solubility in an alkali developer by the action of an acid and having a molecular weight of 5,000 or more,wherein supposing that the 1/2 wave of the oxidation potential of the active seed generated from the compound (B) is E_{pa} and the 1/2 wave of the reduction potential of the active seed generated from the compound (C) is E_{pc} , the relationship: $E_{pc} - E_{pa} > 0$ is satisfied.

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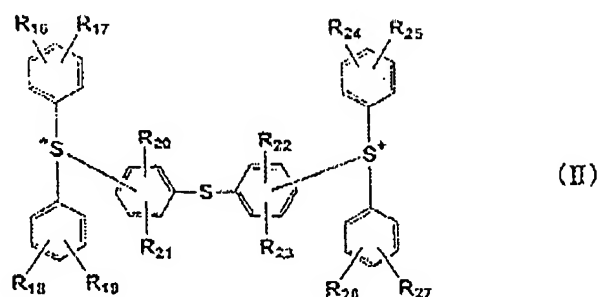
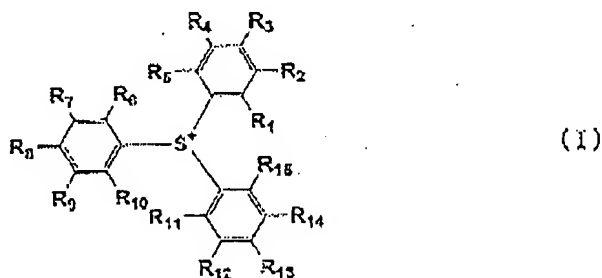
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2. (currently amended): The resist composition according to claim 1, wherein the compound (A) contains a structure represented by the following formula (a):



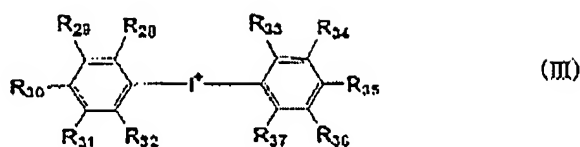
wherein Ra represents a hydrogen atom, a substituted or unsubstituted $\text{C}_6\text{--C}_{16}$ aryl group, a substituted or unsubstituted $\text{C}_1\text{--C}_{20}$ straight-chain, branched or cyclic alkyl group, ---COO^{\cdot} or ---SO_3^{\cdot} , and Rb represents a single bond, ---C(=O)--- , ---NH--- or $\text{---S(---O)}_2\text{---S(---O)}_2\text{---}$.

3. (previously presented): The resist composition according to claim 1, wherein the compound (A) is at least one compound selected from the group consisting of compounds represented by the formulae (a) and (I) to (IV) in combination:



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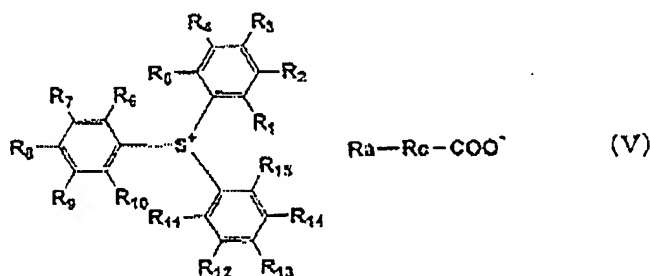
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wherein R_1 to R_{37} each independently represents a hydrogen atom, a straight-chain, branched or cyclic alkyl or alkoxy group, a hydroxyl group, a halogen atom or $-S-R_{38}$ in which R_{38} represents a straight-chain, branched or cyclic alkyl or aryl group, with the proviso that two or more of R_1 to R_{15} , R_{16} to R_{27} and R_{28} to R_{37} may be bonded to each other to form a ring containing one or more selected from the group consisting of a single bond, a carbon atom, an oxygen atom, a sulfur atom and a nitrogen atom, and

R_{39} to R_{42} each independently represents a hydrogen atom or a straight-chain, branched or cyclic alkyl or aryl group.

4. (previously presented): The resist composition according to claim 1, wherein the compound (A) is represented by the following formula (V):



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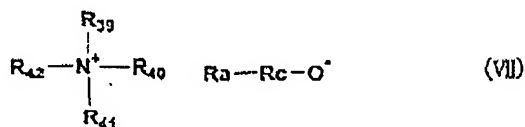
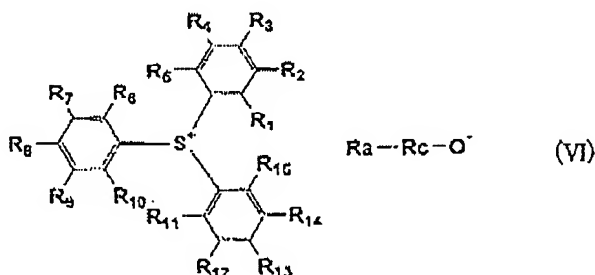
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wherein Ra represents a hydrogen atom, a substituted or unsubstituted C₆-C₁₆ aryl group, a substituted or unsubstituted C₁-C₂₀ straight-chain, branched or cyclic alkyl group, -COO or -SO₃,

Rc represents CH₂, CHRa or C(Ra)₂, and

R₁ to R₁₅ each independently represents a hydrogen atom, a straight-chain, branched or cyclic alkyl or alkoxy group, a hydroxyl group, a halogen atom or -S-R₃₈ in which R₃₈ represents a straight-chain, branched or cyclic alkyl or aryl group, with the proviso that two or more of R₁ to R₁₅ may be bonded to each other to form a ring containing one or more selected from the group consisting of a single bond, a carbon atom, an oxygen atom, a sulfur atom and a nitrogen atom.

5. (original): The resist composition according to claim 1, wherein the compound (A) is represented by the following formula (VI) or (VII):



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wherein Ra represents a hydrogen atom, a substituted or unsubstituted C₆-C₁₆ aryl group, a substituted or unsubstituted C₁-C₂₀ straight-chain, branched or cyclic alkyl group, -COO⁻ or SO₃⁻,

Rc represents CH₂, CHRa or C(Ra)₂,

R₁ to R₁₅ each independently represents a hydrogen atom, a straight-chain, branched or cyclic alkyl or alkoxy group, a hydroxyl group, a halogen atom or -S-R₃₈ in which R₃₈ represents a straight-chain, branched or cyclic alkyl or aryl group, with the proviso that two or more of R₁ to R₁₅ may be bonded to each other to form a ring containing one or more selected from the group consisting of a single bond, a carbon atom, an oxygen atom, a sulfur atom and a nitrogen atom, and

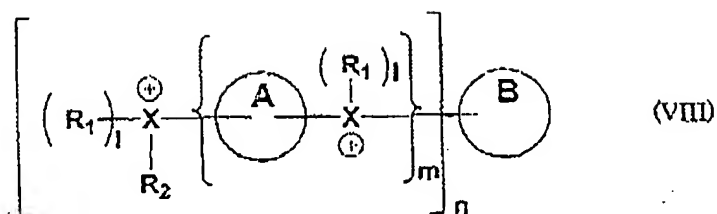
R₃₉ to R₄₂ each independently represents a hydrogen atom or a straight-chain, branched or cyclic alkyl or aryl group.

6. (original): The resist composition according to claim 1, wherein E_{pc} of the compound (C) is higher than -1.15 V.

7. (previously presented): The resist composition according to claim 1, wherein the compound (C) is a compound having a partial structure represented by the following formula (VIII) and a counter ion capable of generating an acid upon irradiation with one of an actinic ray and a radiation:

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wherein X represents a sulfur atom or an iodine atom, with the proviso that the plurality of X's may be the same or different,

R_1 and R_2 each independently represents an alkyl or an aryl group, with the proviso that the plurality of R_1 's, if any, may be the same or different, the plurality of R_2 's, if any, may be the same or different, and R_1 and R_2 , R_1 and A, R_1 and B, R_2 and A, and R_2 and B may be bonded to each other to form a ring,

A and B each independently represents a hydrocarbon structure connecting between X's, with the proviso that at least one of connections of X's with A or B indicates a structure in which X's connected are in the same conjugation and the plurality of A's, if any, may be the same or different,

l represents 0 or 1, with the proviso that when X is a sulfur atom, the number l of R_1 's connected to X represents 1, and when X is an iodine atom, the number l of R_1 's connected to X represents 0,

m represents an integer of from 0 to 10, and

n represents an integer of from 1 to 6, with the proviso that when m is 0, n represents an integer of not smaller than 2.

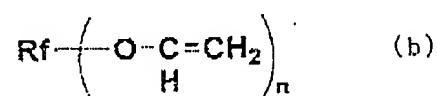
8. (original): The resist composition according to claim 1, wherein the compound (B) is a phenol derivative containing from 1 to 10 benzene ring atomic groups per molecule and

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having at least one hydroxymethyl group and at least one alkoxymethyl group per molecule.

9. (original): The resist composition according to claim 1, wherein the compound (B) contains a structure represented by the following formula (b):



wherein Rf represents a substituted or unsubstituted aryl group, a substituted or unsubstituted straight-chain, branched or alicyclic hydrocarbon group or a combination thereof, which may have a carbonyl group, an oxygen atom or a sulfur atom in the middle portion thereof, and n represents an integer of from 1 to 10.

10. (original): The resist composition according to claim 1, wherein the compound (B) is a cyclic ether compound.

11. (original): The resist composition according to claim 1, further comprising (E) a nitrogen-containing basic compound.

12. (original): The resist composition according to claim 1, wherein the actinic ray or radiation is selected from the group consisting of electron ray, X ray and EUV ray.

13. (currently amended): A negative-working resist composition comprising:

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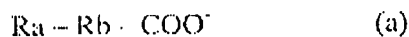
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(A) at least one compound selected from the group consisting of compounds represented by the formulae (a) and (I) to (IV) in combination,

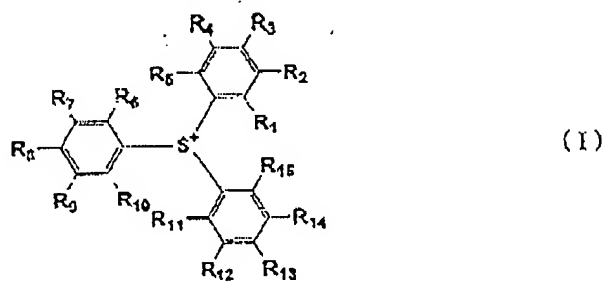
(B) a crosslinking agent capable of carrying out addition reaction with the alkali-soluble resin which is the component (D1) by the action of an acid,

(C) a compound having a partial structure represented by the following formula (VIII) and a counter ion capable of generating an acid upon irradiation with one of an actinic ray and a radiation, and

(D1) an alkali-soluble resin having a phenol skeleton:

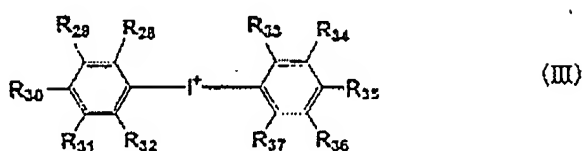
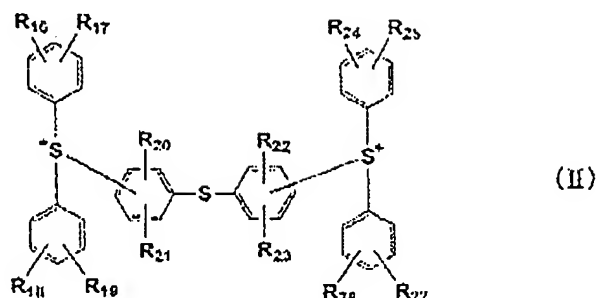


wherein Ra represents a hydrogen atom, a substituted or unsubstituted $\text{C}_6\text{-C}_{10}$ aryl group, a substituted or unsubstituted $\text{C}_1\text{-C}_{20}$ straight-chain, branched or cyclic alkyl group, $-\text{COO}^-$ or $-\text{SO}_3^-$, and Rb represents a single bond, $-\text{C}(=\text{O})-$, $-\text{NH}-$ or $-\text{S}(=\text{O})_2-$, $-\text{S}(=\text{O})_2-$



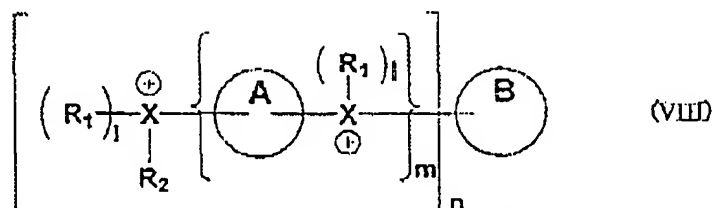
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wherein R_1 to R_{37} each independently represents a hydrogen atom, a straight-chain, branched or cyclic alkyl or alkoxy group, a hydroxyl group, a halogen atom or $-S-R_{38}$ in which R_{38} represents a straight-chain, branched or cyclic alkyl or aryl group, with the proviso that two or more of R_1 to R_{15} , R_{16} to R_{27} and R_{28} to R_{37} may be bonded to each other to form a ring containing one or more selected from the group consisting of a single bond, a carbon atom, an oxygen atom, a sulfur atom and a nitrogen atom, and

R_{39} to R_{42} each independently represents a hydrogen atom or a straight-chain, branched or cyclic alkyl or aryl group;



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wherein X represents a sulfur atom or an iodine atom, with the proviso that the plurality of X's may be the same or different,

R₁ and R₂ each independently represents an alkyl or an aryl group, with the proviso that the plurality of R₁'s, if any, may be the same or different, the plurality of R₂'s, if any, may be the same or different, and R₁ and R₂, R₁ and A, R₁ and B, R₂ and A, and R₂ and B may be bonded to each other to form a ring,

A and B each independently represents a hydrocarbon structure connecting between X's, with the proviso that at least one of connections of X's with A or B indicates a structure in which X's connected are in the same conjugation and the plurality of A's, if any, may be the same or different,

l represents 0 or 1, with the proviso that when X is a sulfur atom, the number l of R₁'s connected to X' represents 1, and when X is an iodine atom, the number l of R₁'s connected to X' represents 0,

m represents an integer of from 0 to 10, and

n represents an integer of from 1 to 6, with the proviso that when m is 0, n represents an integer of not smaller than 2.

14. (previously presented): A negative-working resist composition comprising:

(A) at least one compound selected from the group consisting of compounds represented by the formulae (a') and (I) to (IV) in combination,

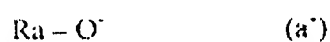
(B) a crosslinking agent capable of carrying out addition reaction with the alkali-soluble resin which is the component (D1) by the action of an acid,

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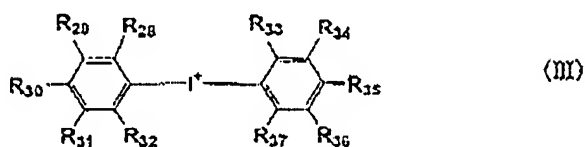
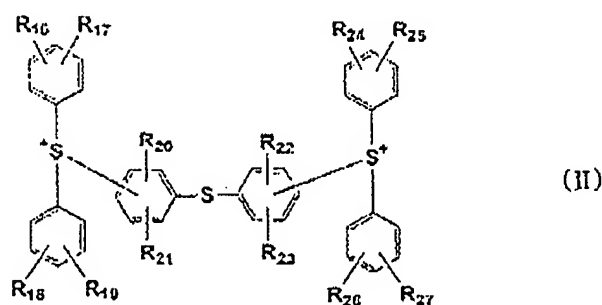
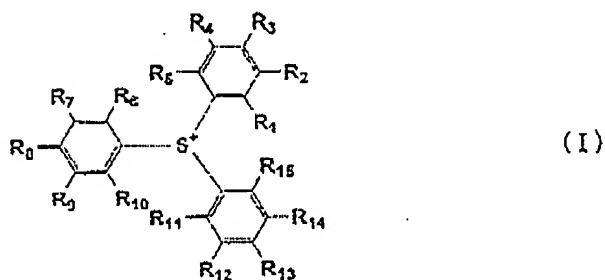
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(C) a compound having a partial structure represented by the following formula (VIII)
and a counter ion capable of generating an acid upon irradiation with one of an actinic ray and a
radiation, and

(D1) an alkali-soluble resin:



wherein Ra represents a hydrogen atom, a substituted or unsubstituted C₆-C₁₆ aryl group,
a substituted or unsubstituted C₁-C₂₀ straight-chain, branched or cyclic alkyl group, -COO⁻ or
SO₃⁻:



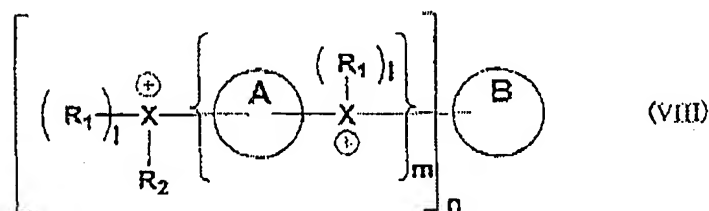
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wherein R_1 to R_{37} each independently represents a hydrogen atom, a straight-chain, branched or cyclic alkyl or alkoxy group, a hydroxyl group, a halogen atom or $-S-R_{38}$ in which R_{38} represents a straight-chain, branched or cyclic alkyl or aryl group, with the proviso that two or more of R_1 to R_{15} , R_{16} to R_{27} and R_{28} to R_{37} may be bonded to each other to form a ring containing one or more selected from the group consisting of a single bond, a carbon atom, an oxygen atom, a sulfur atom and a nitrogen atom, and

R_{39} to R_{42} each independently represents a hydrogen atom or a straight-chain, branched or cyclic alkyl or aryl group:



wherein X represents a sulfur atom or an iodine atom, with the proviso that the plurality of X's may be the same or different.

R_1 and R_2 each independently represents an alkyl or an aryl group, with the proviso that the plurality of R_1 's, if any, may be the same or different, the plurality of R_2 's, if any, may be the same or different, and R_1 and R_2 , R_1 and A, R_1 and B, R_2 and A, and R_2 and B may be bonded to each other to form a ring,

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A and B each independently represents a hydrocarbon structure connecting between X^+ 's, with the proviso that at least one of connections of X^+ 's with A or B indicates a structure in which X^+ 's connected are in the same conjugation and the plurality of A's, if any, may be the same or different,

l represents 0 or 1, with the proviso that when X is a sulfur atom, the number l of R_1 's connected to X^+ represents 1, and when X is an iodine atom, the number l of R_1 's connected to X^+ represents 0,

m represents an integer of from 0 to 10, and

n represents an integer of from 1 to 6, with the proviso that when m is 0, n represents an integer of not smaller than 2.

15. (previously presented): The negative-working resist composition according to claim 13, wherein the component (A) is at least one compound selected from the compounds represented by the formula (a) and the formula (I) or (II) in combination.

16. (previously presented): The negative-working resist composition according to claim 13, further comprising (E) a nitrogen-containing basic compound.

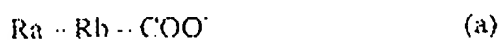
17. (currently amended): A positive-working resist composition comprising:
(A) at least one compound selected from the group consisting of compounds represented by the formulae (a) and (I) to (IV) in combination.

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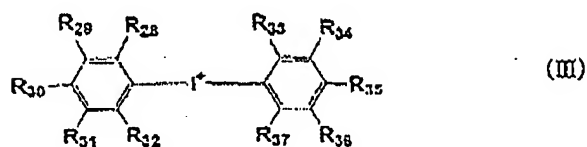
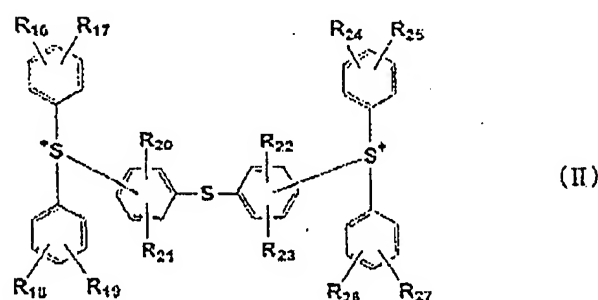
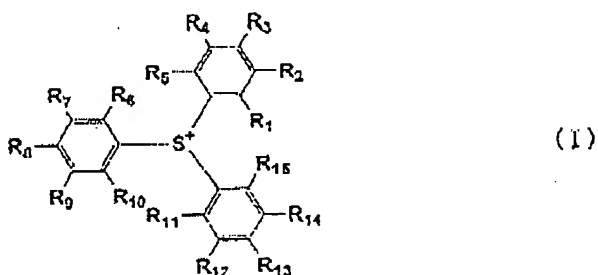
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(C) a compound having a partial structure represented by the following formula (VIII) and a counter ion capable of generating an acid upon irradiation with one of an actinic ray and a radiation, and

(D2) a resin increasing the solubility in an alkali developer by the action of an acid:



wherein Ra represents a hydrogen atom, a substituted or unsubstituted C₆-C₁₆ aryl group, a substituted or unsubstituted C₁-C₂₀ straight-chain, branched or cyclic alkyl group, -COO⁻ or -SO₃⁻, and Rb represents a single bond, -C(=O)-, -NH-, or $S(=O)_2$, $S(=O)_2$.



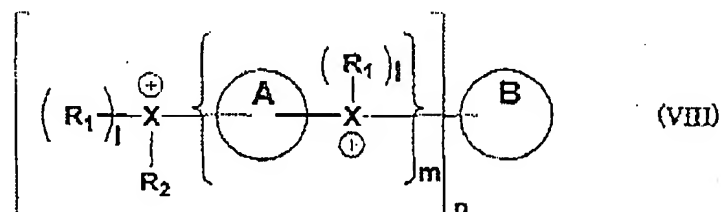
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wherein R_1 to R_{37} each independently represents a hydrogen atom, a straight-chain, branched or cyclic alkyl or alkoxy group, a hydroxyl group, a halogen atom or $S-R_{38}$ in which R_{38} represents a straight-chain, branched or cyclic alkyl or aryl group, with the proviso that two or more of R_1 to R_{15} , R_{16} to R_{27} and R_{28} to R_{37} may be bonded to each other to form a ring containing one or more selected from the group consisting of a single bond, a carbon atom, an oxygen atom, a sulfur atom and a nitrogen atom, and

R_{39} to R_{42} each independently represents a hydrogen atom or a straight-chain, branched or cyclic alkyl or aryl group:



wherein X represents a sulfur atom or an iodine atom, with the proviso that the plurality of X 's may be the same or different,

R_1 and R_2 each independently represents an alkyl or an-aryl group, with the proviso that the plurality of R_1 's, if any, may be the same or different, the plurality of R_2 's, if any, may be the same or different, and R_1 and R_2 , R_1 and A , R_1 and B , R_2 and A , and R_2 and B may be bonded to each other to form a ring,

A and B each independently represents a hydrocarbon structure connecting between X 's, with the proviso that at least one of connections of X 's with A or B indicates is a structure in

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which X¹'s connected are in the same conjugation and the plurality of Λ's, if any, may be the same or different,

l represents 0 or 1, with the proviso that when X is a sulfur atom, the number l of R_l's connected to X¹ represents 1, and when X is an iodine atom, the number l of R_l's connected to X¹ represents 0,

m represents an integer of from 0 to 10, and

n represents an integer of from 1 to 6, with the proviso that when m is 0, n represents an integer of not smaller than 2.

18. (previously presented): A positive-working resist composition comprising:

(A) at least one compound selected from the group consisting of compounds represented by the formulae (a') and (I) to (IV) in combination,

(C) a compound having a partial structure represented by the following formula (VIII) and a counter ion capable of generating an acid upon irradiation with one of an actinic ray and a radiation, and

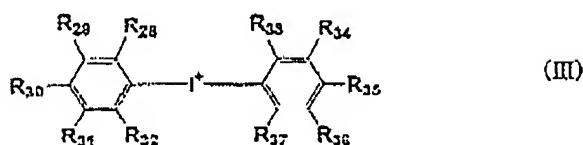
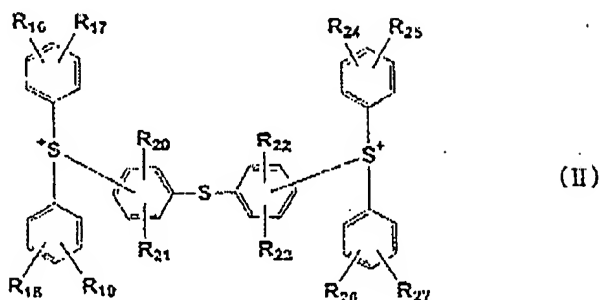
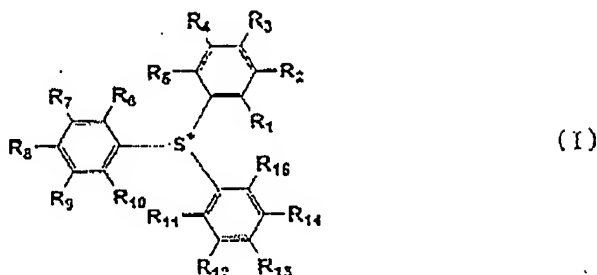
(D2) a resin increasing the solubility in an alkali developer by the action of an acid:



wherein Ra represents a hydrogen atom, a substituted or unsubstituted C₆-C₁₀ aryl group, a substituted or unsubstituted C₁-C₂₀ straight-chain, branched or cyclic alkyl group, -COO⁻ or SO₃⁻:

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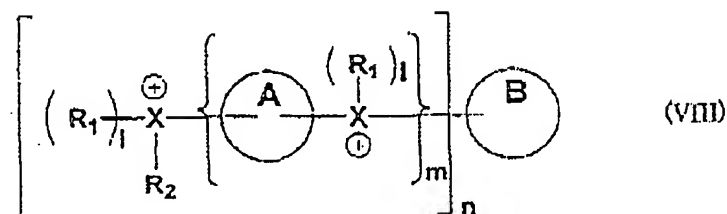


wherein R_1 to R_{37} each independently represents a hydrogen atom, a straight-chain, branched or cyclic alkyl or alkoxy group, a hydroxyl group, a halogen atom or $S-R_{38}$ in which R_{38} represents a straight-chain, branched or cyclic alkyl or aryl group, with the proviso that two or more of R_1 to R_{15} , R_{16} to R_{27} and R_{28} to R_{37} may be bonded to each other to form a ring containing one or more selected from the group consisting of a single bond, a carbon atom, an oxygen atom, a sulfur atom and a nitrogen atom, and

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R_{39} to R_{42} each independently represents a hydrogen atom or a straight-chain, branched or cyclic alkyl or aryl group:



wherein X represents a sulfur atom or an iodine atom, with the proviso that the plurality of X's may be the same or different.

R_1 and R_2 each independently represents an alkyl or an aryl group, with the proviso that the plurality of R_1 's, if any, may be the same or different, the plurality of R_2 's, if any, may be the same or different, and R_1 and R_2 , R_1 and A, R_1 and B, R_2 and A, and R_2 and B may be bonded to each other to form a ring,

A and B each independently represents a hydrocarbon structure connecting between X's, with the proviso that at least one of connections of X's with A or B indicates a structure in which X's connected are in the same conjugation and the plurality of A's, if any, may be the same or different.

l represents 0 or 1, with the proviso that when X is a sulfur atom, the number l of R_1 's connected to X represents 1, and when X is an iodine atom, the number l of R_1 's connected to X represents 0,

m represents an integer of from 0 to 10, and

n represents an integer of from 1 to 6, with the proviso that when m is 0, n represents an integer of not smaller than 2.

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19. (previously presented): The positive-working resist composition according to claim 17, wherein the component (A) is at least one compound selected from the compounds represented by the formula (a) and the formula (I) or (II) in combination.

20. (original): The positive-working resist composition according to claim 17, further comprising (E) a nitrogen-containing basic compound.

21. (original): The resist composition according to claim 13, wherein the actinic ray or radiation is selected from the group consisting of electron ray, X ray and EUV ray.

22. (new): The resist composition according to claim 1, wherein the amount of the component (D1) is from 50 to 80% by weight based on the total solids content of the resist composition.

23. (new): The resist composition according to claim 1, wherein the amount of the component (D2) is from 70 to 98% by weight based on the total solids content of the resist composition.

24. (new): The resist composition according to claim 1, wherein the amount of component (B) is from 3 to 65% by weight based on the total solids content of the resist composition.